
2. PURPOSE AND NEED

Chapter 2 discusses the U.S. Department of Energy's purpose and need to provide a tritium supply capability. The purpose of the Department's action is to produce, in one or more commercial light water reactors, the tritium required to maintain the nation's nuclear weapons stockpile.

Since nuclear weapons came into existence in 1945, a nuclear deterrent has been a cornerstone of the nation's defense policy and national security. Both President Clinton and the Congress have reiterated this principle in public statements and through legislation. The President has stated on a number of occasions his commitment to maintaining a nuclear deterrent capability. Most recently, in May 1997, the President stated in *A National Security Strategy for a New Century* (White House 1997) that, "... our nuclear deterrent posture is one of the most visible and important examples of how U.S. military capabilities can be used effectively to deter aggression and coercion. Nuclear weapons serve as a hedge against an uncertain future, a guarantee of our security commitments to allies, and a disincentive to those who would contemplate developing or otherwise acquiring their own nuclear weapons."

U.S. strategic nuclear systems are based on designs that use tritium gas. Since tritium decays at a rate of about 5.5 percent per year (i.e., every 12.3 years one half of the tritium has decayed), periodic replacement is required as long as the United States relies on a nuclear deterrent. The nation, therefore, requires a reliable source of tritium to maintain its nuclear weapons stockpile.

As explained in Section 1.3.1, the size of the nation's nuclear weapons stockpile is determined by the Secretaries of Defense and Energy who, in coordination with the Nuclear Weapons Council, jointly sign and submit to the President the Nuclear Weapons Stockpile Memorandum. This Memorandum transmits the Nuclear Weapons Stockpile Plan to the President for final approval. Many factors are considered in the development of the Nuclear Weapons Stockpile Plan, including the status of the currently approved stockpile, arms control negotiations and treaties, Congressional constraints, and the status of the nuclear material production and fabrication facilities. Under this plan, the Department of Energy (DOE) can determine the amount of tritium necessary to support the approved stockpile.

Tritium is a radioactive isotope of hydrogen and an essential component of every warhead in the current and projected U.S. nuclear weapons stockpile. These warheads depend on tritium so they can perform as designed. Tritium's relatively short radioactive half-life necessitates the periodic replenishment of tritium in nuclear weapons to ensure that they will function as designed. Over the past 40 years, DOE has built and operated over a dozen nuclear reactors (five of them at the Savannah River Site in South Carolina) to produce tritium and other nuclear materials for weapons purposes. Today, none of these reactors are operational, and DOE has not produced tritium for addition to the stockpile since 1988. According to the Atomic Energy Act of 1954, however, DOE is responsible for developing and maintaining the capability to produce the nuclear materials, such as tritium, that are necessary for the defense of the United States (40 U.S.C. 2011).

Until a new tritium supply source is operational, DOE will continue to support tritium requirements by recycling tritium from weapons retired from the nation's stockpile. However, because of the tritium decay rate, recycling can only meet the tritium demands for a limited time, even with the reduction in stockpile requirements and no identified need for new-design weapons in the foreseeable future. Current projections, derived from the most recently approved, classified projections of future stockpile scenarios, indicate that

recycled tritium will support the nation's nuclear weapons stockpile adequately until approximately 2005 (Figure 2-1).

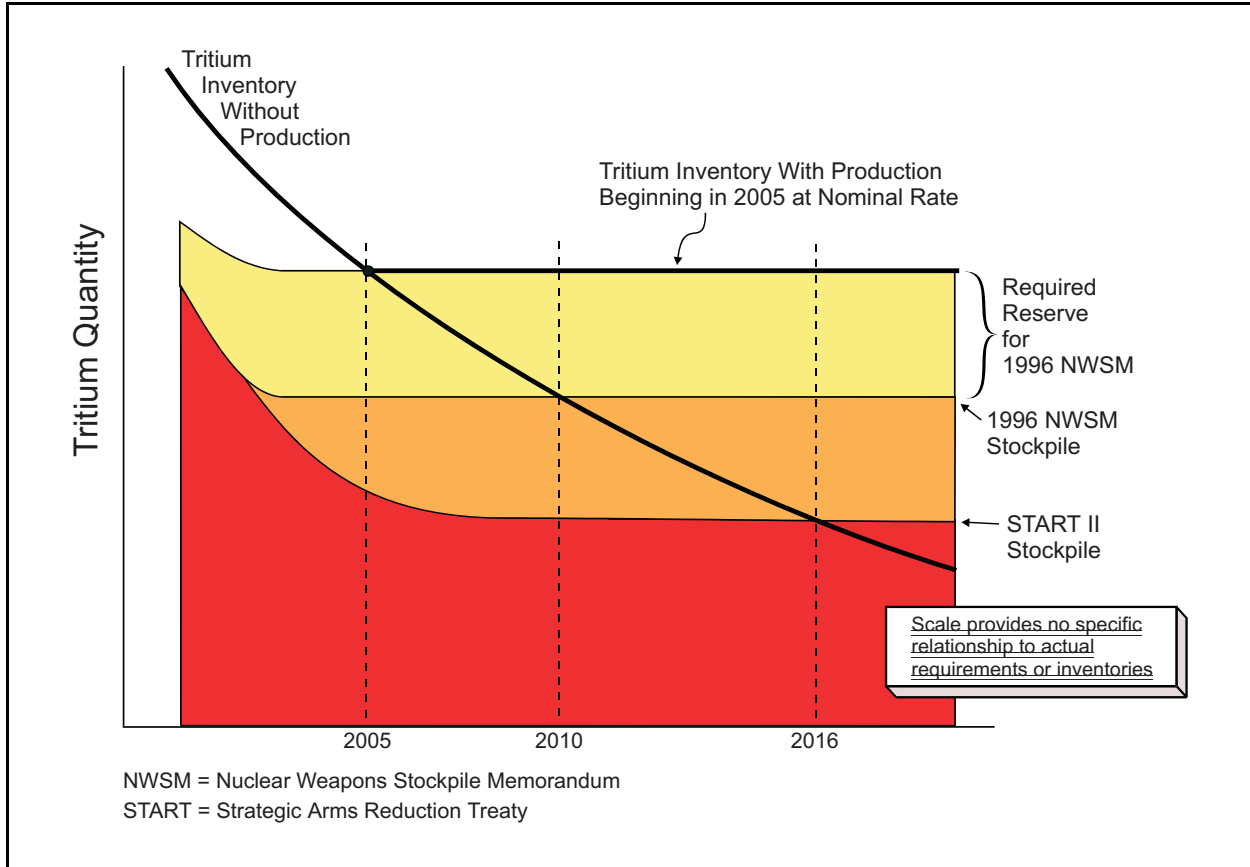


Figure 2-1 Estimated Tritium Inventory and Reserve Requirements

Even with a reduced nuclear weapons stockpile and no identified requirement for new nuclear weapons production in the foreseeable future, an ensured long-term tritium supply and recycling capability will be required to maintain the weapons determined to be needed for national defense under the prevailing Nuclear Weapons Stockpile Plan. Presently, no U.S. source of new tritium is available. The effectiveness of the U.S. nuclear deterrent capability depends not only on the nation's current stockpile of nuclear weapons or the effectiveness of those it can produce, but also on its ability to reliably and safely provide the tritium needed to maintain these weapons.

To meet requirements mandated by the President and supported by the Congress, the United States will need a new source of tritium production by approximately 2005. For planning purposes, the operational life of the new production source would be about 40 years. Without a new supply source, after 2005 the United States would have to use its five-year reserve of tritium to maintain the readiness of the nuclear weapons stockpile. The five-year reserve contains a quantity of tritium maintained for emergencies and contingencies. In such a scenario, the complete depletion of the five-year tritium reserve would degrade the nuclear deterrent capability because not all weapons in the stockpile would be able to function as designed. Eventually, the United States would lose its nuclear deterrent. The purpose of DOE's action is to produce, in one or more commercial light water reactors, the tritium needed to maintain the nation's nuclear weapons stockpile.

The Tennessee Valley Authority's (TVA) purpose and need relative to this environmental impact statement are to maximize the use of its resources while simultaneously providing support to national defense. National defense support has been one of TVA's historic multipurpose missions (see Section 1.3.6).